
Evaluations of Complex Climate Research Initiatives

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Presentation Objectives

- What is the right evaluation approach for climate research initiatives of differing complexity?
- Present “ten-factor” framework for assessing evaluation complexity to select the right design
- Showcase evaluation approaches for simple, complicated, and complex climate research initiatives
 - Logic models
 - Measures
 - Methods

Climate Adaptation: Complex Problem

Uncertainties abound in:

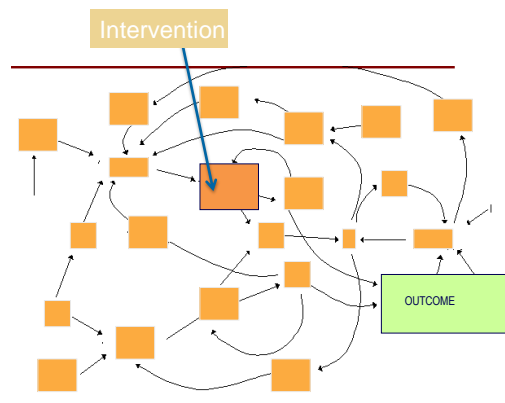
- the amount of climate forcing that will occur in the next few decades
- how the climate system will respond to that forcing
- how both human and natural systems will change in response
- how climate-related policies and programs will interact with other social and environmental policies

Source: GLISA

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What Do Complex Situations Look Like?



Source: Foster-Fishman et al. 2007.

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Climate Adaptation: Complex Solutions

We need to find innovative solutions that:

- **Take into account the complexity of the problem**
- **Permit our systems to learn, adapt, and occasionally transform without collapsing**

We need to build capacity to find such solutions over and over again

Source: Frances Westley

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System Goal: Increased Resilience

- **Resilience is the capacity of individuals, communities, and countries to not only adapt but to survive and thrive in a changing environment.**
- **Resilience is an approach that can guide and organize the cross-scale, multidisciplinary, collaborative ways of managing the transition toward more sustainable development paths.**

Source: REOS

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Climate Research Evaluation

Evaluating social innovation and resilience:

- Is an opportunity to learn from experience and requires a process that can capture the unanticipated consequences of an intervention
- Has real value from different people's perspectives

Source: REOS

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10 Factors Affecting Evaluation Complexity

- Ten factors affect the level of complexity:
 1. Situational dynamics
 2. Intervention complexity
 3. Governance structure
 4. Theory of change
 5. Execution strategy
 6. Scale of outcomes
 7. Sequence, scale, and timing of expected results
 8. Evaluation purpose
 9. Reporting and use of evaluation findings
 10. Evaluation methods

How Complex Is the Context?

- **Factor 1: Situational dynamics.** How complex are the dynamics of the context or environment in which the intervention is operating?

Situational Dynamics

- **Random**
 - Unorganized
 - Chaotic
- **Simple**
 - Organized activity
 - Knowable, predictable
- **Complicated**
 - Organized activity
 - Partially knowable, predictable
- **Complex (adaptive)**
 - Emergent activity
 - Unknowable, predictable within limited scope



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Simple Dynamics

- **Stable, standardized processes**
- **Parts connected like a machine; predictable cause-effect relationships**
- **System can be reduced to parts and processes and copied or replicated**
- **Single causal path to clearly defined outcomes**
- **Network – high centrality and low density**
- **What works is knowable as best practice**

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Complicated Dynamics

- Multiple components organized (concurrently or sequentially) to achieve specific outcomes
- Multiple, coordinated causal pathways (causal packages) lead to complementary outcomes
- Interrelated parts within and across system levels create system interactions and feedback loops
- Network – high centrality and high density
- Expertise needed to design, coordinate parts and identify what works, for whom, and in what circumstances

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Complex Adaptive Dynamics

- Agents adapt and co-evolve in response to external, top-down needs and opportunities
- Agents self-organize, learn, and change; new systemwide patterns emerge through internal, bottom-up interactions among system parts
- System equilibrium is in flux, sensitive to initial conditions – butterfly effect and tipping points
- Network – low centrality and high density
- “What” is constantly changing; plans develop as the program or initiative unfolds

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How Complex Is the Intervention?

- **Factor 2: Intervention complexity.** Is the intervention a simple, direct process change; a test of a program model; or a larger initiative addressing multisector, multilevel population or systems change?
- **Factor 3: Governance structure.** Who is funding and overseeing the initiative—a single organization, a federal funder of a cohort of grantees, or a consortium of funders?

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How Complex Is the Intervention?

- **Factor 4: Theory of change.** Is the program adapting or implementing a best practice, testing a program model, or applying general principles to a complex systems-change process?
- **Factor 5: Execution strategy.** Is the project's implementation plan a clearly specified set of procedures, or is it developed collectively and adapted over time by the initiative's partners and stakeholders?

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How Complex Is the Intervention?

- **Factor 6: Scale of outcomes.** What is the expected change—a process improvement; changes in a small, specified set of individual-level outcomes; or a broader systemwide change?
- **Factor 7: Time line of expected results.** Will early results be seen in days, weeks, or months?

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Resilience: Theory of Change

- **Overall goal:** increased resilience at the individual, organization, communities, state, and national levels
- **Long-term impacts:** community conditions support resilience – collective capacity to respond to and influence climate
- **Short-term outcome:** stakeholders use climate research in decision-making to adapt, implement, and spread resilience-related policies, programs, and practices
- **Immediate outcome:** stakeholders understand, value, and accept climate research findings

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RISA Theory of Action/Implementation

- **RISA mission:** To support research teams that expand/build capacity to prepare and adapt for climate variability and change
- **Climate research outputs:** timely and relevant reports, assessments of climate impacts, risks, vulnerability, and adaptive response options
- **Research production process:** trainings, workshops, tools, decision support, scenario planning, assessment, networking, interaction and dialogue between scientists and stakeholders
- **Research inputs:** resources, teams with skills

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RISA Functions: Range

- **Simple:** information broker providing climate information, reports, files (70% of stakeholders involved in CLIMAS projects)
- **Complicated:** Informal consultant (53%), short-term partner (37%)
- **Complex:** Long-term collaborator (17%)

Source: CLIMAS

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Simple Project: Example

- **Outputs:** Season climate reports, monthly files, potential outlooks, client-requested research
- **Process:** Completion of applied research projects, standardized reports. Dissemination of results through broad communication channels and networks
- **Role:** Contractual – client-sponsored work
- **Resources:** Time, technical skills, and resources to conduct and disseminate report research

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Complicated Project: Example

- **Outputs:** Scenario plans, risk assessments, project reports, client briefings
- **Process:** Short-term consultation projects providing data and information based on work with client to define the question, method for answering the question, analyzing the results, and reporting the findings
- **Role:** Consultative
- **Resources:** Time, technical skills, capacity to consult, and resources

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Complex Project: Example

- **Outputs:** co-produced climate research products and activities
- **Process:** Action research, transdisciplinary research, rapid assessment projects, participatory integrated assessments, boundary organization work, comprehensive system change initiatives
- **Role:** Collaborative, collegial
- **Resources:** Time, technical skills, social skills to develop collaborative working relationships, and resources

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How Complex Is the Evaluation?

- **Factor 8: Evaluation purpose.** What are the evaluation's goals? Are the research questions about implementing and testing the efficacy of a particular best practice or program model? Or do the questions address how best to move forward in a complex initiative?
- **Factor 9: Reporting and use of findings.** When, how, and to whom are results reported? Is the reporting linked to, or kept separate from, sessions with decision makers to interpret the findings and take action?

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What Is the Evaluation Approach?

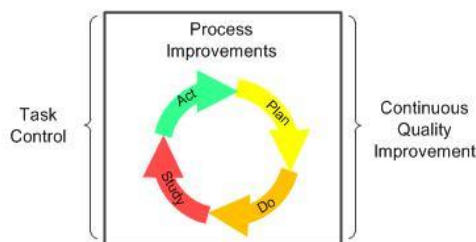
- **Factor 10: Rapid evaluation methods.** Which evaluation methods are the best match for the circumstances?
 - Quality improvement
 - Rapid-cycle evaluation
 - Systems-based evaluation with rapid feedback
 - Nested methods address multiple levels
- Findings can be collected (what?), interpreted (so what?), and used (now what?) in adaptive action cycles

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Continuous Quality Improvement Methods

- Continuous quality improvement (CQI) methods track the implementation and results of simple tasks
- CQI uses repeated PDSA (plan-do-study-act) cycles for ongoing performance management and improvement



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Simple Project Evaluation Methods and Metrics

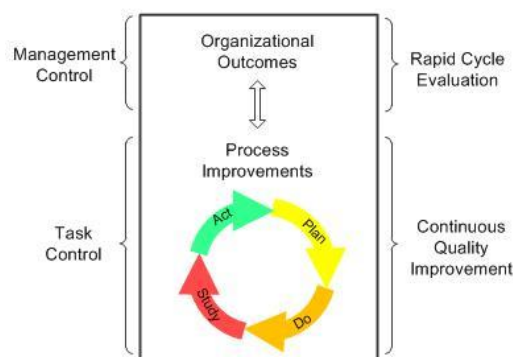
- Focuses only on task-level activities (the part)
- Misses the organization-level context and its influence on the task (the whole)
- Misses the external environmental context and its influence on the task (the greater whole)
- Task metrics: timeliness of completion, data quality, report credibility, reach of dissemination

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Rapid-Cycle Evaluation Methods

- The Centers for Medicare & Medicaid Services (CMS) developed rapid-cycle evaluation methods to test innovative program models



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Complicated Evaluation Methods and Metrics

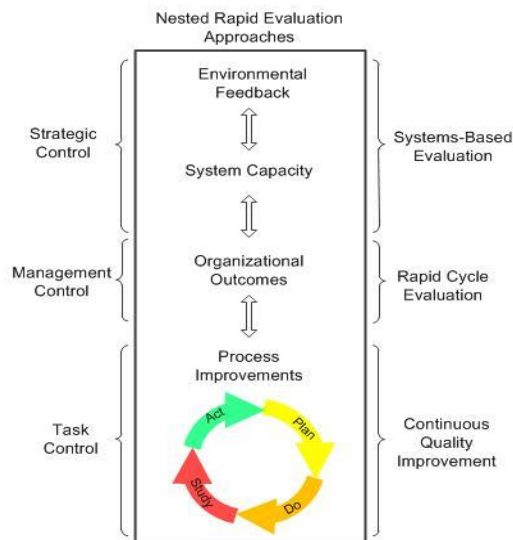
- Misses the interplay of task-level activities (the parts) and their influence on organizational outcomes
- Focuses only on organization-level activities, outcomes, and context (the whole)
- Misses the dynamics of the external environment (greater whole) and its influence on organizational performance
- Metrics: Client satisfaction with report, understanding of findings, relevance of topic, quality production process

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Nested Rapid Evaluation Approach

- Evaluating an initiative from task, organization, and systems perspectives enables managers to trigger change more effectively at multiple leverage points



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Complex Evaluation Methods and Metrics

- Addresses the performance and improvement of key tasks and activities (the parts)
- Tracks project and organization outcomes (whole)
- Evaluates the larger initiative, in which the project is embedded (the greater whole)
- Uses a systems framework to understand the interactions among these elements
- Supports adaptive action through ongoing interpretation and use of findings
- Metrics: networked leadership, quality of collaboration, social learning, transparent process

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How to Use This Framework

- As a heuristic tool rather than a how-to manual; there is no best rapid evaluation method
- The right method (or combination) addresses the goal of the evaluation and captures the complexities of the intervention and its organizational and environmental context
- Rapid evaluation methods are not mutually exclusive; they can and should be nested at each ecological layer
- Rapid evaluation methods can be used in an adaptive action cycle and adaptive management

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Final Presentation Thoughts

- **Rapid evaluation** should be part of an interactive and **adaptive action cycle**, in which **internal operational results** and **external environmental feedback** are used together in an **iterative process** to test and revise an initiative's overall strategy and improve its **ongoing development**

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For More Information

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